PATENT ABSTRACTS OF JAPAN

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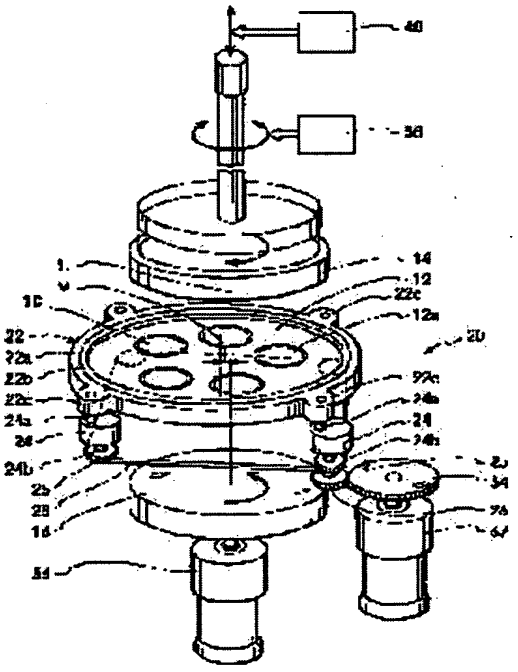
(54) BOTH SIDE POLISHING DEVICE

(57)Abstract:
PROBLEM TO BE SOLVED: To polish a wafer uniformly by giving a carrier a circular motion with no self-rotation within a plane parallel to an surface of the carrier, and moving a work retained between upper and lower surface plates while turning in the through hole of the carrier.
SOLUTION: If the rotational movement of an upper surface plate 14 and a lower surface plate 16, and the circular motion with no self-rotation of a carrier 12 are conducted concurrently, a wafer 10 is retained so as to be capable of rotating in a through hole 12a. Especially, if a difference is made between the absolute values of the rotational speed of the upper surface plate 14 and that of the lower surface plate 16 (the rotational speed of one surface plate is made larger than that of the other surface plate), the wafer 10 rotates together in the rotational direction of the surface plate whose rotational speed is higher, that is, the wafer 10 rotates in a prescribed direction. As a result of self-rotation of the wafer 10 its peripheral velocity increases more as it goes toward its outer periphery more at the upper surface plate 14 or the lower surface plate 16, however, the influence of the result can be eliminated, thus it is possible to polish the wafer 10 uniformly.



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* NOTICES *

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CLAIMS

[Claim(s)]
[Claim 1] In double-sided polish equipment equipped with the surface plate of the upper and lower sides which move relatively and grind it to this work piece while inserting the tabular work piece arranged in the bore of the carrier with which a bore prepares and grows into a thin plate, and this carrier from the upper and lower sides Double-sided polish equipment characterized by providing the carrier circular-motion device in which carry out the circular motion which does not rotate said carrier in a field parallel to the field of this carrier, and turning migration of said work piece held between up-and-down surface plates within said bore is carried out.
[Claim 2] The carrier electrode holder with which said carrier circular-motion device holds said carrier, The shaft by the side of the electrode holder which is parallel to the axis of the surface plate of said upper and lower sides, and is fixed to revolve by said carrier electrode holder, And it has a shaft by the side of the base which keeps a predetermined distance and is fixed to revolve by the base while it is parallel to the shaft by the side of this electrode holder. Double-sided polish equipment according to claim 1 characterized by providing the eccentric arm to which the circular motion which does not rotate a carrier electrode holder to a base by making it circle in the shaft by the side of an electrode holder centering on the shaft by the side of said base is carried out, and the revolution driving gear made to rotate this eccentric arm centering on the shaft by the side of a base.
[Claim 3] It is double-sided polish equipment according to claim 2 characterized by coordinating the shafts by the side of said base by synchronous means, such as a timing chain, so that two or more said eccentric arms are prepared, and these two or more eccentric arms may synchronize and it may move circularly.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to double-sided polish equipment. By rotating EKUSUTANARUGIYA (henceforth a "external gear"), and an internal gear (henceforth a "internal gear") with a different angular velocity from the former as double-sided polish equipment While making the carrier equivalent to the epicyclic gear which supported the processing ingredient (henceforth a "work piece") rotate, it is made to revolve around the sun. There is a thing using the epicyclic gear device which it moves relatively to a work piece and grinds while the surface plate of the upper and lower sides which have the polished surface where the carrier was arranged up and down sandwiches a work piece from the upper and lower sides. It is used as wrapping equipment (lapping machine) or polishing equipment, this double-sided polish equipment has a high precision, and since it can grind both sides simultaneously, floor to floor time is short, and ends, and it fits split polish processing of the silicon wafer used as the raw material of a semiconductor chip etc.
[0002]
[Description of the Prior Art] The configuration of the polishing equipment using the conventional epicyclic gear device is explained based on drawing 3 . 112 is a top board, 114 is a lower lapping plate, abrasive cloth is attached to each front face, and the polished surface is formed by the abrasive cloth. 116 is an external gear and 118 is an internal gear. Moreover, it is a carrier, and a work piece 121 is held in the bore drilled by this carrier 120, and 120 gears with an external gear 116 and an internal gear 118, and rotates. A top board 112 is coordinated with top board lathe dog 112a, and gear 112c is prepared at the head of shaft 112b which hung from this top board lathe dog 112a. Gear 112c has geared to gear 112e idle-gear 112d and idle-gear 112d. This gear 112e is prepared in a spindle 126 and the same axle that it should rotate to a spindle 126 and one. The lower lapping plate 114 is coordinated with gear 114b prepared in the lower lapping plate 114 on the same axle at the spindle 126 through gear 114a prepared in the same axle. The external gear 116 is coordinated with transfer gear 116b prepared in the external gear 116 on the same axle at the spindle 126 through gear 116a prepared in the same axle. The internal gear 118 is coordinated with transfer gear 118b prepared in the internal gear 118 on the same axle at the spindle 126 through gear 118a prepared in the same axle. That is, this polishing equipment serves as 4 so-called way actuation methods which carry out revolution actuation of an external gear 116, an internal gear 118, and the up-and-down surface plates 112 and 114 with one driving gear. In addition, a spindle 126 is connected with the adjustable reducer 132, and the adjustable reducer 132 is connected with the motor 134 through the belt 136, and it controls the rotational speed of a spindle 126.
[0003] According to the polishing equipment using this epicyclic gear device, for example so that the direction of the angular velocity of an internal gear 118 may become large compared with the angular velocity of an external gear 116 The speed ratio of gear 116a and transfer gear 116b, And when the speed ratio of gear 118a and transfer gear 118b is set up, respectively, the carrier 120 which got into gear between the external gear 116 and the internal gear 118 revolves around the sun in the same direction (for example, it considers as a "counterclockwise rotation") as the hand of cut of an internal gear 118, and rotates clockwise. Moreover, although a lower lapping plate 114 similarly rotates counterclockwise, since idle-gear 112d intervenes, a top board 112 rotates clockwise. In addition, according to polish conditions, a hand of cut, rotational speed, etc. of a carrier

120 can be changed by setting out of the angular velocity of an external gear 116 and an internal gear 118. Moreover, the liquefied abrasive material containing a slurry etc. is supplied to the polished surface of the front flesh side of a work piece 121, and polish of a work piece 121 is suitably made according to an operation of the liquefied abrasive material. According to this polishing equipment, since a carrier 120 can be made to exercise intricately, polish unevenness is prevented and work-piece 121 (for example, silicon wafer) polish can be carried out at homogeneity. Therefore, the display flatness of a work piece can be improved. Moreover, since both sides of a work piece 121 can be ground simultaneously, polish effectiveness can be improved.

[0004]

[Problem(s) to be Solved by the Invention] However, with the double-sided polish equipment using the conventional epicyclic gear device, since it becomes the structure which a carrier 120 moves between an external gear 116 and an internal gear 118, it is hard to respond to enlargement of the work pieces 121, such as the latest silicon wafer. That is, the technical problem that it was impossible to make the diameter of a carrier 120 larger than the radius of a surface plate, and the polished surface of a surface plate could not be used efficiently occurred. Moreover, with the double-sided polish equipment using the conventional epicyclic gear device, it had become a complicated gear mechanism, and it was difficult to enlarge and there were technical problems that cost increased in respect of being various, such as an ingredient, processing, and an arrangement tooth-space-problem, in manufacturing large-sized equipment.

[0005] Then, it corresponds to enlargement of a work piece suitably, the polished surface of a surface plate can be used efficiently, and a configuration does not become complicated, but the object of this invention is to offer the double-sided polish equipment which can reduce a manufacturing cost while it prevents the polish unevenness of a wafer and can improve the display flatness of a wafer.

[0006]

[Means for Solving the Problem] This invention is equipped with the next configuration in order to attain the above-mentioned object. This invention namely, the tabular work piece arranged in the bore of the carrier with which a bore prepares and grows into a thin plate, and this carrier In double-sided polish equipment equipped with the surface plate of the upper and lower sides which move relatively and are ground to this work piece while inserting from the upper and lower sides The carrier circular-motion device in which carry out the circular motion which does not rotate said carrier in a field parallel to Men of this carrier, and turning migration of said work piece held between up-and-down surface plates within said bore is carried out is provided.

[0007] Moreover, the carrier electrode holder with which said carrier circular-motion equipment holds said carrier, The shaft by the side of the electrode holder which is parallel to the axis of the surface plate of said upper and lower sides, and is fixed to revolve by said carrier electrode holder, And it has a shaft by the side of the base which keeps a predetermined distance and is fixed to revolve by the base while it is parallel to the shaft by the side of this electrode holder. By providing the eccentric arm to which the circular motion which does not rotate a carrier electrode holder to a base by making it circle in the shaft by the side of an electrode holder centering on the shaft by the side of said base is carried out, and the revolution driving gear made to rotate this eccentric arm centering on the shaft by the side of a base Though it is an easy configuration, the circular motion which does not rotate suitably the carrier held at the carrier electrode holder can be carried out.

[0008] Moreover, two or more said eccentric arms are prepared, and a carrier can be made to exercise suitably and stably with an easy configuration by the shafts by the side of said base being coordinated by synchronous means, such as a timing chain, so that these two or more eccentric arms may synchronize and it may move circularly.

[0009]

[Embodiment of the Invention] Hereafter, the suitable example of this invention is explained to a detail based on an accompanying drawing. Drawing 1 is strabism assembly drawing having shown typically one example of the double-sided polish equipment concerning this invention, and drawing 2 is the sectional side elevation showing the physical relationship of each configuration at the time of the example of drawing 1 operating. This example is double-sided polish equipment which grinds the wafer 10 of the silicon which is a tabular work piece, and is equipped with the surface plates 14

and 16 of the upper and lower sides which move relatively and grind it to a wafer 10 while inserting the carrier 12 with which bore 12a prepares and grows into a thin plate, and the wafer 10 arranged in the bore of the carrier 12 from the upper and lower sides. Abrasive cloth 14a and 16a is attached to each front face of the up-and-down surface plates 14 and 16, and the polished surface is formed in it by the abrasive cloth 14a and 16a. The wafer 10 has fitted in loosely in circular and circular bore 12a, and has free size which can rotate in bore 12a.

[0010] 20 is a carrier circular-motion device, carries out the circular motion which does not rotate a carrier 12 in a field parallel to Men of a carrier 12, and carries out turning migration of the wafer 10 held between the top board 14 and the lower lapping plate 16 within bore 12a. This carrier circular-motion device 20 is equipped with the next configuration. 22 is a carrier electrode holder, is formed in the shape of a ring, and is equipped with body of ring 22a, and presser-foot Ring 2 2b. The rim of presser-foot Ring 2 2b [this body of ring 22a and] of the circular carrier 12 is pinched, and a carrier 12 is held with them at the carrier electrode holder 22.

[0011] 24 is an eccentric arm, and it is equipped with shaft 24b by the side of the base which keeps a predetermined distance and is fixed to revolve by the base 30 (refer to drawing 2) while it is parallel to the axis L of the up-and-down surface plates 14 and 16 and parallel to shaft 24a by the side of the electrode holder fixed to revolve by the carrier electrode holder 22, and shaft 24a by the side of the electrode holder. That is, it is formed so that it may have the same function as the crank arm of a crank chain. In this example, this eccentric arm 24 is making it circle in shaft 24a by the side of an electrode holder focusing on shaft 24b by the side of a base, and carries out the circular motion which does not rotate the carrier electrode holder 22 to a base 30 while it is allotted to four between a base 30 and the carrier electrode holder 22 and supports the carrier electrode holder 22. Shaft 24a by the side of an electrode holder is inserted and fixed to revolve pivotable to bearing 22c prepared in the peripheral face of the carrier electrode holder 22 by projecting. Thereby, a carrier 12 circles by M [eccentric] Carrying out from the axis L of the up-and-down surface plates 14 and 16 (circular motion which does not rotate). The radius of the circular motion is the same as spacing (distance of eccentricity M) of shaft 24a by the side of an electrode holder, and shaft 24b by the side of a base, and all the points of a carrier 12 serve as motion describing the locus of the same small circle.

[0012] Moreover, 28 is a timing chain and is hung about on the sprocket 25 (this example four pieces) fixed to shaft 24b by the side of the base of each eccentric arm 24 by the same axle. This timing chain 28 and four sprockets 25 constitute a synchronous means to coordinate shaft 24b by the side of four bases, and to synchronize them so that four eccentric arms 24 may synchronize and move circularly. This synchronous means is an easy configuration and can make a carrier 12 exercise suitably and stably. By this, polish precision can be improved and the display flatness of a wafer can be improved. In addition, as a synchronous means, it is not restricted to this example and, of course, a timing chain or a gear may be used. 32 is a motor (for example, GYADO motor), and 34 is the output gear fixed to the output shaft. The output gear 34 meshes with the gear 26 fixed to shaft 24b by the side of the base of the eccentric arm 24 by the same axle. Thereby, the revolution driving gear made to rotate the eccentric arm 24 focusing on shaft 24b by the side of a base is constituted.

[0013] In addition, two or more motors (for example, electric motor) arranged respectively corresponding to each eccentric arm 24 can also be used for a revolution driving gear. If it is an electric motor, synchronous motion of two or more eccentric arms 24 can be carried out, and a carrier 12 can be made to exercise smoothly by taking a synchronization electrically. Moreover, although this example explained the case where four eccentric arms 24 were arranged, this invention can support the carrier electrode holder 22 suitably, if there are not only this but at least three eccentric arms 24. Furthermore, if the mobile and said carrier electrode holder 22 of the X-Y table which can obtain two-dimensional motion are unified and it enables it to exercise by composition of a biaxial rectilinear motion which intersects perpendicularly, by actuation of one eccentric arm 24, rotate, there is nothing and the circular motion of the carrier electrode holder 22 can be carried out. That is, by showing around with the guide prolonged in biaxial [biaxial and an X-Y table cross at right angles], said mobile carries out motion which does not rotate and can use motion of this mobile suitable for motion (circular motion which does not rotate) of the carrier electrode holder 22. Moreover, the carrier electrode holder 22 united with said mobile can also be made to exercise by using the drive which consists of a servo motor, a timing chain, or a ball screw arranged on each of

the driving means of an X-Y table, for example, the X-axis, and a Y-axis not using the eccentric arm 24 (control) (circular motion which does not rotate). In this case, although two motors will be used, the various two-dimensional motion which does not rotate besides the circular motion can be obtained by controlling a motor, and that motion can be used for polish of a wafer 10.
[0014] 36 is a motor for a lower lapping plate revolution, and is a power plant made to rotate a lower lapping plate 16. For example, a GYADO motor can be used and the output shaft may be made to link with the revolving shaft of a lower lapping plate 16 directly like this example. 38 is a power means for a top board revolution, and rotates a top board 14. The motor 36 for a lower lapping plate revolution and the power means 38 for a top board revolution can respond to the thing which can change a hand of cut and rotational speed freely, then various polish specifications flexibly.
Moreover, with this double-sided polish equipment, the wafer 10 arranged in bore 12a of a carrier 12 is made sandwiches by the top board 14 and the lower lapping plate 16, as shown in drawing 2 , and polish processing of that wafer is made. Under the present circumstances, the force in which a wafer 10 is compressed is based on the application-of-pressure means (not shown) mainly formed in the top board 14 side. For example, pneumatic pressure is used and you may make it force a top board 14 on a wafer 10 by the air bag method in addition. Welding pressure can be adjusted suitably and easily by controlling pneumatic pressure. In addition, the lifting device 40 which moves vertically the top board 14 other than an application-of-pressure means is formed in a top board 14 side, and when it is feeding and discarding of a wafer 10, it operates.
[0015] Next, the operation of this invention is explained. First, the case where a top board 14 and a lower lapping plate 16 are rotated to an opposite direction although the absolute value of rotational speed is the same is explained without making a carrier 12 exercise. That is, as shown in drawing 1 , a top board 14 carries out a clock revolution, and carries out the counter clockwise of the lower lapping plate 16. In this case, since frictional force completely acts on an opposite direction, that motion force is offset mutually, and after the wafer 10 has stopped, double-sided polish is made theoretically. However, in this case, by the top board 14 and the lower lapping plate 16, that peripheral velocity becomes large, so that it goes to that periphery. Therefore, polish is promoted and a wafer 10 is not ground for the further part from the part corresponding to the axis L of the surface plates 14 and 16 of the upper and lower sides of a wafer 10 by homogeneity.
[0016] Next, scouring by carrying out the circular motion which does not rotate according to the motion device which consists of a configuration of having mentioned the carrier 12 above is explained. When a revolution of the up-and-down surface plates 14 and 16 is not considered but only the circular motion to which a carrier 12 does not rotate is considered, according to the circular motion which does not rotate, all the motion completely same in respect of the member (carrier 12) which exercises will be made. This is the semantics from which all points serve as the same motion, is a kind of splash motion, and should just think that the locus of splash motion became a circle. Therefore, if turning migration of the wafer 10 is carried out through the carrier 12 which carries out the circular motion which does not rotate and it will say only within the operation by this motion, both sides of a wafer 10 will be ground by homogeneity.
[0017] And when operating simultaneously rotation of a top board 14 and a lower lapping plate 16, and the circular motion to which a carrier 12 does not rotate Since the wafer 10 is held pivotable in bore 12a, when it distinguishes between the absolute value of the rotational speed of a top board 14 and a lower lapping plate 16 especially (when rotational speed of the surface plate of another side is made quick to one surface plate), A wafer 10 is carried out the circumference of a companion to the hand of cut of the surface plate of a side with the quick rotational speed. That is, a wafer 10 will rotate in the predetermined direction. Thus, although the peripheral velocity is large at the top board 14 and the lower lapping plate 16 so that it goes to the periphery because a wafer 10 rotates, the effect can be lost and a wafer 10 can be ground to homogeneity. In addition, what is necessary is just to control the rotational speed of a top board 14 and a lower lapping plate 16 so that one side becomes quick by turns in order to grind both sides of a wafer 10 to homogeneity.
[0018] Next, other operation of this invention is explained. Although the above example explained the case where two or more bore 12a was prepared, and two or more work pieces (wafer 10) were ground simultaneously, in this invention, only a piece prepares bore 12a by which a large-sized work piece is held not only in this but in the carrier 12, and it can use also as polish equipment which

grinds both sides of the large-sized work piece. In addition, there are work pieces, such as a wafer (circular) processed by the rectangle-like glass plate used for liquid crystal or the sheet as a large-sized work piece. In this case, a large-sized work piece will be arranged almost extensively ranging from the core to near [that] near the periphery of a carrier 12. It grinds at this time, mainly using the circular motion by the carrier 12 which does not rotate, and the rotational speed of a top board 14 and a lower lapping plate 16 can be ground uniformly and suitably about the whole work-piece side, if it is made late to extent which polish unevenness does not generate. That is, although scouring becomes large, if the rotational speed is dramatically as slow as a periphery compared with the circular motion to which a carrier 12 does not rotate, it can avoid making it almost participate in scouring directly by the difference in peripheral velocity at a top board 14 and a lower lapping plate 16. And since scouring is made good, rotating a top board 14 and a lower lapping plate 16 making the surface plate side in contact with a work piece always update, and supplying a liquefied abrasive material to the whole surface of a work piece on the average etc. can contribute suitably indirectly.
[0019] Although the above example explained polishing equipment, as for this invention, it is needless to say that it is applicable suitable also for wrapping equipment. as mentioned above, although the suitable example was given per this invention and many things have been explained, this invention is not limited to this example and comes out not to mention the ability to change many within limits which do not deviate from the pneuma of invention.
[0020]
[Effect of the Invention] According to the double-sided polish equipment of this invention, the circular motion which does not rotate a carrier in a field parallel to Men of the carrier is carried out according to a carrier circular-motion device, and turning migration of the work piece held between up-and-down surface plates within the bore of a carrier is carried out. Since the same motion is made in all the parts of a carrier, while being able to grind a wafer to homogeneity according to the circular motion which does not rotate, the whole carrier surface and the polished surface of an up-and-down surface plate can be used efficiently. For this reason, while preventing the polish unevenness of a wafer and being able to improve the display flatness of a wafer, the higher efficacy that it corresponds to enlargement of a work piece suitably, and the polished surface of a surface plate can be used efficiently is done so. Moreover, compared with the double-sided polish equipment using the conventional epicyclic gear device, a configuration does not become complicated, but it is the configuration that it can respond to enlargement suitably, and the higher efficacy that a manufacturing cost can be reduced is done so.

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is strabism assembly drawing of one example of the double-sided polish equipment concerning this invention.
[Drawing 2] It is the sectional side elevation of the example of drawing 1 .
[Drawing 3] It is a sectional side elevation explaining the conventional technique.
[Description of Notations]
10 Wafer
12 Carrier
12a Bore
14 Top Board
16 Lower Lapping Plate
20 Carrier Circular-Motion Device
22 Carrier Electrode Holder
24 Eccentric Arm
24a The shaft by the side of an electrode holder
24b The shaft by the side of a base
28 Timing Chain
30 Base

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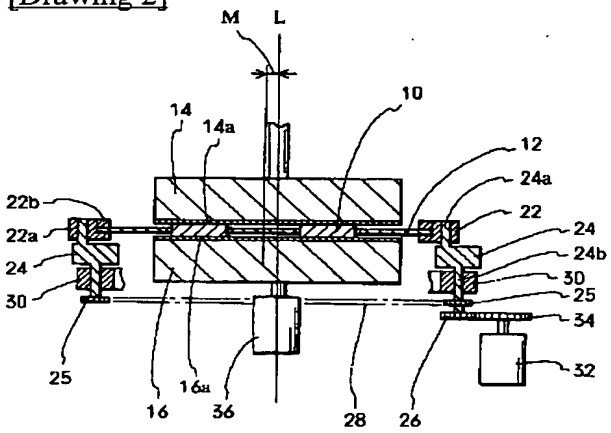
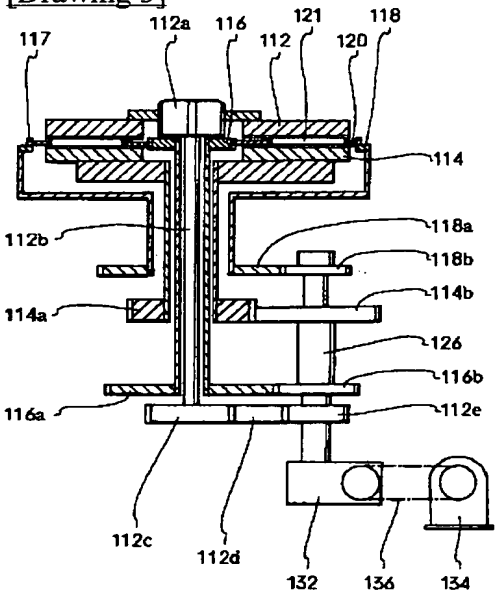
DRAWINGS

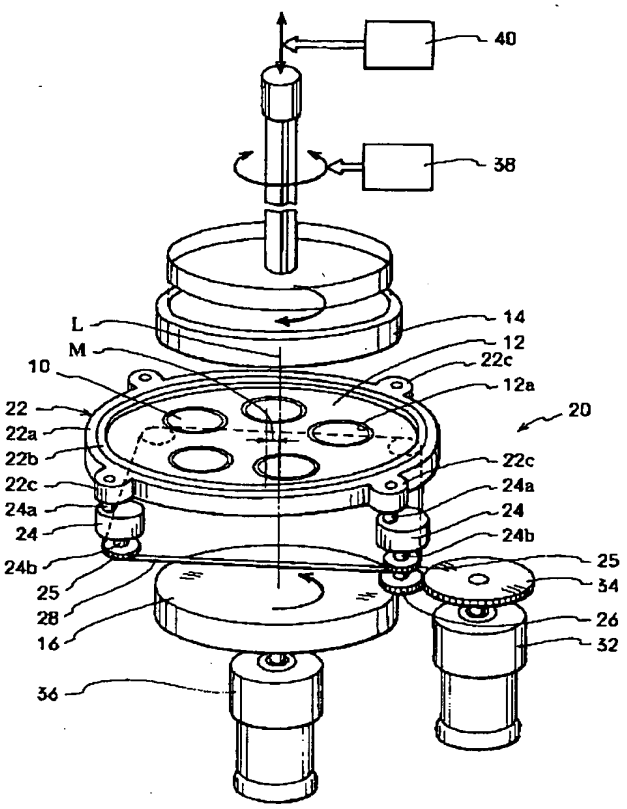
[Drawing 2]



[Drawing 3]



[Drawing 1]



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CORRECTION OR AMENDMENT

[Kind of official gazette] Printing of amendment by the convention of 2 of Article 17 of Patent Law
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[Procedure amendment]
[Filing Date] June 12, Heisei 12 (2000. 6.12)
[Procedure amendment 1]
[Document to be Amended] Description
[Item(s) to be Amended] Claim
[Method of Amendment] Modification
[Proposed Amendment]
[Claim(s)]
[Claim 1] The carrier with which the bore by which a work piece goes into a plate is prepared, and changes,
The top board which grinds the top face of said work piece which was arranged on this carrier upside and arranged in the bore of said carrier,
The lower lapping plate which grinds the underside of said work piece while inserting said work piece which was arranged on said carrier bottom and arranged in the bore of said carrier with said top board,
The carrier electrode holder which is formed in the shape of a ring and holds said carrier to the inside,
Double-sided polish equipment characterized by providing the carrier circular-motion device in which make said work piece held between said top boards and said lower lapping plates within said bore follow on said carrier by carrying out the circular motion which does not rotate said carrier in a field parallel to the field of this carrier through this carrier electrode holder, make it exercise, and both sides of said work piece are made to grind by said top board and said lower lapping plate.
[Claim 2] The carrier with which the bore by which a work piece goes into a plate is prepared, and changes,
The top board which grinds the top face of said work piece which was arranged on this carrier upside and arranged in the bore of said carrier,

The lower lapping plate which grinds the underside of said work piece while inserting said work piece which was arranged on said carrier bottom and arranged in the bore of said carrier with said top board,
Make said work piece held between said top boards and said lower lapping plates within said bore follow on said carrier by carrying out the circular motion which does not rotate said carrier in a field parallel to the field of this carrier, and it is made to exercise, and has the carrier circular-motion device in which both sides of a work piece are made to grind by said top board and said lower lapping plate,
Said carrier circular-motion device,
Base,
The carrier electrode holder holding said carrier,
The crank arm to which the circular motion which does not rotate said carrier electrode holder to said base by having a shaft by the side of the base which keeps a predetermined distance and is fixed to revolve by the base while an axial center is parallel to the direction of an axis of said top board and a lower lapping plate and an axial center is parallel to the shaft by the side of the electrode holder fixed to revolve by said carrier electrode holder and the shaft by the side of this electrode holder, and making it circle in the shaft by the side of an electrode holder centering on the shaft by the side of said base is carried out,
Double-sided polish equipment characterized by providing the revolution driving gear made to rotate this crank arm centering on the shaft by the side of a base.
[Claim 3] It is double-sided polish equipment according to claim 2 characterized by coordinating the shafts by the side of said base by synchronous means, such as a timing chain, so that two or more said crank arms are prepared, and these two or more crank arms may synchronize and it may move circularly.
[Claim 4] Said top board and said lower lapping plate are double-sided polish equipment according to claim 1, 2, or 3 characterized by carrying out rotation actuation.
[Procedure amendment 2]
[Document to be Amended] Description
[Item(s) to be Amended] 0006
[Method of Amendment] Modification
[Proposed Amendment]
[0006]
[Means for Solving the Problem] This invention is equipped with the next configuration in order to attain the above-mentioned object. That is, it is characterized by equipping this invention with the following. The carrier with which the bore by which a work piece goes into a plate is prepared, and changes The top board which grinds the top face of said work piece which was arranged on this carrier upside and arranged in the bore of said carrier The lower lapping plate which grinds the underside of said work piece while inserting said work piece which was arranged on said carrier bottom and arranged in the bore of said carrier with said top board The carrier circular-motion device in which are formed in the shape of a ring, make said work piece held between said top boards and said lower lapping plates within said bore follow on said carrier by carrying out the circular motion which does not rotate said carrier in a field parallel to the field of this carrier through the carrier electrode holder which holds said carrier to the inside, and this carrier electrode holder, make it exercise, and both sides of said work piece are made to grind by said top board and said lower lapping plate
[Procedure amendment 3]
[Document to be Amended] Description
[Item(s) to be Amended] 0007
[Method of Amendment] Modification
[Proposed Amendment]
[0007] Moreover, the carrier with which the bore by which a work piece goes into a plate is prepared, and this invention changes, While inserting the top board which grinds the top face of said work piece which was arranged on this carrier upside and arranged in the bore of said carrier, and said work piece which was arranged on said carrier bottom and arranged in the bore of said carrier with said top board By carrying out the lower lapping plate which grinds the underside of said work

piece, and the circular motion which does not rotate said carrier in a field parallel to the field of this carrier Make said work piece held between said top boards and said lower lapping plates follow on said carrier, and it is made to exercise within said bore. It has the carrier circular-motion device in which both sides of a work piece are made to grind by said top board and said lower lapping plate. Said carrier circular-motion device The shaft by the side of a base, the carrier electrode holder holding said carrier, and the electrode holder that an axial center is parallel to the direction of an axis of said top board and a lower lapping plate, and is fixed to revolve by said carrier electrode holder, And it has a shaft by the side of the base which keeps a predetermined distance and is fixed to revolve by the base while an axial center is parallel to the shaft by the side of this electrode holder. The crank arm to which the circular motion which does not rotate said carrier electrode holder to said base by making it circle in the shaft by the side of an electrode holder centering on the shaft by the side of said base is carried out, It is also in the double-sided polish equipment characterized by providing the revolution driving gear made to rotate this crank arm centering on the shaft by the side of a base. According to this, though it is an easy configuration, it rotates suitably, there is nothing and the circular motion of the carrier held at the carrier electrode holder can be carried out.
[Procedure amendment 4]
[Document to be Amended] Description
[Item(s) to be Amended] 0008
[Method of Amendment] Modification
[Proposed Amendment]
[0008] Moreover, two or more said crank arms are prepared, and these two or more crank arms can make a carrier exercise suitably and stably with that the shafts by the side of said base are coordinated by synchronous means, such as a timing chain, and an easy configuration so that it may move circularly synchronously. Moreover, said top board and said lower lapping plate can grind a work piece suitably by rotation actuation being carried out.

[Translation done.]

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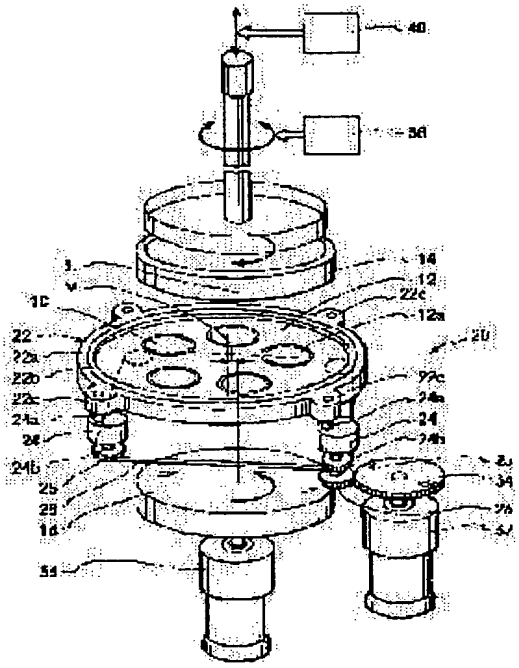
(54) BOTH SIDE POLISHING DEVICE

(57)Abstract:
PROBLEM TO BE SOLVED: To polish a wafer uniformly by giving a carrier a circular motion with no self-rotation within a plane parallel to an surface of the carrier, and moving a work retained between upper and lower surface plates while turning in the through hole of the carrier.
SOLUTION: If the rotational movement of an upper surface plate 14 and a lower surface plate 16, and the circular motion with no self-rotation of a carrier 12 are conducted concurrently, a wafer 10 is retained so as to be capable of rotating in a through hole 12a. Especially, if a difference is made between the absolute values of the rotational speed of the upper surface plate 14 and that of the lower surface plate 16 (the rotational speed of one surface plate is made larger than that of the other surface plate), the wafer 10 rotates together in the rotational direction of the surface plate whose rotational speed is higher, that is, the wafer 10 rotates in a prescribed direction. As a result of self-rotation of the wafer 10 its peripheral velocity increases more as it goes toward its outer periphery more at the upper surface plate 14 or the lower surface plate 16, however, the influence of the result can be eliminated, thus it is possible to polish the wafer 10 uniformly.



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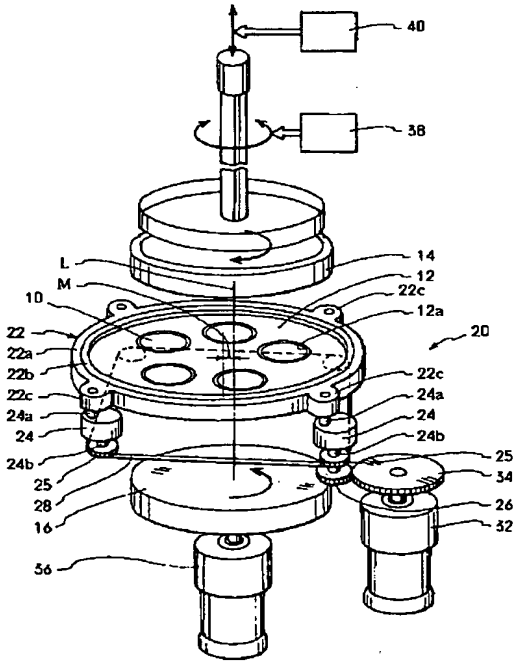
最終頁に続く

(54)【発明の名称】　両面研磨装置

(57)【要約】

【課題】　ワークの大型化に好適に対応して定盤の研磨面を効率良く利用でき、構成が複雑にならず、製造コストを低減できること。

【解決手段】　薄平板に透孔１２ａが設けられて成るキャリア１２と、該キャリア１２の透孔１２ａ内に配された板状のウェーハ１０を、上下から挟むと共にウェーハ１０に対して相対的に移動して研磨する上下の定盤１４、１６とを備える両面研磨装置において、キャリア１２を、該キャリア１２の面と平行な面内で自転しない円運動をさせ、透孔１２ａ内で上下の定盤１４、１６の間に保持されたウェーハ１０を旋回移動させるキャリア円運動機構２０を具備する。



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【特許請求の範囲】

【請求項１】　薄平板に透孔が設けられて成るキャリアと、該キャリアの透孔内に配された板状のワークを、上下から挟むと共に該ワークに対して相対的に移動して研磨する上下の定盤とを備える両面研磨装置において、

前記キャリアを、該キャリアの面と平行な面内で自転しない円運動をさせ、前記透孔内で上下の定盤の間に保持された前記ワークを旋回移動させるキャリア円運動機構を具備することを特徴とする両面研磨装置。

【請求項２】　前記キャリア円運動機構は、

前記キャリアを保持するキャリアホルダーと、

前記上下の定盤の軸線に平行で前記キャリアホルダーに軸着されるホルダー側の軸、および該ホルダー側の軸に平行であると共に所定の距離をおいて基体に軸着される基体側の軸を備え、前記基体側の軸を中心にホルダー側の軸を旋回させることでキャリアホルダーを基体に対して自転しない円運動をさせる偏心アームと、

該偏心アームを基体側の軸を中心に回転させる回転駆動装置とを具備することを特徴とする請求項１記載の両面研磨装置。

【請求項３】　前記偏心アームが複数設けられ、該複数の偏心アームは同期して円運動するよう、前記基体側の軸同士がタイミングチェーン等の同期手段によって連繋されていることを特徴とする請求項２記載の両面研磨装置。

【発明の詳細な説明】

【０００１】

【発明の属する技術分野】本発明は両面研磨装置に関する。両面研磨装置としては、従来から、エクスターナルギヤ（以下、「外歯車」という）とインターナルギヤ（以下、「内歯車」という）を異なる角速度で回転することによって、加工材料（以下、「ワーク」という）を担持した遊星歯車に相当するキャリアを自転させるとともに公転させ、そのキャリアの上下に配された研磨面を有する上下の定盤が、ワークを上下から挟むと共にワークに対して相対的に移動して研磨する遊星歯車機構を用いたものがある。この両面研磨装置は、ラッピング装置（ラップ盤）、またはポリッシング装置として使用され、精度が高く、両面を同時に研磨できるため加工時間が短くて済み、半導体チップの素材となるシリコンウェーハ等の薄物研磨加工に適している。

【０００２】

【従来の技術】従来の遊星歯車機構を用いたポリッシング装置の構成について、図３に基づいて説明する。１１２は上定盤、１１４は下定盤であり、それぞれの表面には研磨布が付けられており、その研磨布によって研磨面が形成されている。１１６は外歯車、１１８は内歯車である。また、１２０はキャリアであり、このキャリア１２０に穿設された透孔内にワーク１２１が保持され、外歯車１１６と内歯車１１８と噛み合って回転する。上定盤１１２は上定盤回し金１１２ａに連繋され、この上定盤回し金１１２ａから垂下したシャフト１１２ｂの先端にギヤ１１２ｃが設けられている。ギヤ１１２ｃはアイドルギヤ１１２ｄと、アイドルギヤ１１２ｄはギヤ１１２ｅに噛合している。このギヤ１１２ｅは、スピンドル１２６と一体に回転すべく、スピンドル１２６と同軸に設けられている。下定盤１１４は、その下定盤１１４に同軸に設けられたギヤ１１４ａを介し、スピンドル１２６に同軸に設けられたギヤ１１４ｂに連繋している。外歯車１１６は、その外歯車１１６に同軸に設けられたギヤ１１６ａを介し、スピンドル１２６に同軸に設けられた伝達ギヤ１１６ｂに連繋している。内歯車１１８は、その内歯車１１８に同軸に設けられたギヤ１１８ａを介し、スピンドル１２６に同軸に設けられた伝達ギヤ１１８ｂに連繋している。すなわち、このポリッシング装置は、一つの駆動装置によって、外歯車１１６、内歯車１１８、上下の定盤１１２、１１４を回転駆動させる、いわゆる４ウェイ駆動方式となっている。なお、スピンドル１２６は可変減速機１３２に連結され、その可変減速機１３２は、ベルト１３６を介してモータ１３４と連結されており、スピンドル１２６の回転速度を制御する。

【０００３】この遊星歯車機構を用いたポリッシング装置によれば、例えば、外歯車１１６の角速度に比べて内歯車１１８の角速度の方が大きくなるようにギヤ１１６ａと伝達ギヤ１１６ｂの回転比、およびギヤ１１８ａと伝達ギヤ１１８ｂの回転比がそれぞれ設定されている場合、外歯車１１６と内歯車１１８との間に噛合したキャリア１２０は、内歯車１１８の回転方向と同一方向（例えば、「反時計方向」とする）に公転し、且つ時計方向に自転する。また、下定盤１１４も同じく反時計方向に回転するが、上定盤１１２はアイドルギヤ１１２ｄが介在するので時計方向に回転する。なお、研磨条件に応じて、キャリア１２０の回転方向および回転速度等は、外歯車１１６と内歯車１１８の角速度の設定によって変更することができる。また、ワーク１２１の表裏の研磨面へは、スラリー等を含む液状の研磨剤が供給され、その液状の研磨剤の作用によってワーク１２１の研磨が好適になされる。このポリッシング装置によれば、キャリア１２０を複雑に運動させることができるため、研磨むらを防止して均一にワーク１２１（例えば、シリコンウェーハ）研磨できる。従って、ワークの平坦度を向上できる。また、ワーク１２１の両面を同時に研磨できるため、研磨効率を向上できる。

【０００４】

【発明が解決しようとする課題】しかしながら、従来の遊星歯車機構を用いた両面研磨装置では、キャリア１２０が外歯車１１６と内歯車１１８の間で移動する構造になるため、最近のシリコンウェーハ等のワーク１２１の大型化に対応しにくい。すなわち、キャリア１２０の直径を、定盤の半径より大きくすることは不可能であり、

定盤の研磨面を効率良く利用することができないという課題があった。また、従来の遊星歯車機構を用いた両面研磨装置では、複雑な歯車機構となっており、大型化することが難しく、大型の装置を製造するには材料、加工、配置スペース的な問題など、様々な面でコストが嵩むという課題があった。

【０００５】そこで、本発明の目的は、ウェーハの研磨むらを防止してウェーハの平坦度を向上できると共に、ワークの大型化に好適に対応して定盤の研磨面を効率良く利用でき、構成が複雑にならず、製造コストを低減できる両面研磨装置を提供することにある。

【０００６】

【課題を解決するための手段】上記の目的を達成するため、本発明は次の構成を備える。すなわち、本発明は、薄平板に透孔が設けられて成るキャリアと、該キャリアの透孔内に配された板状のワークを、上下から挟むと共に該ワークに対して相対的に移動して研磨する上下の定盤とを備える両面研磨装置において、前記キャリアを、該キャリアの面と平行な面内で自転しない円運動をさせ、前記透孔内で上下の定盤の間に保持された前記ワークを旋回移動させるキャリア円運動機構を具備する。

【０００７】また、前記キャリア円運動装置は、前記キャリアを保持するキャリアホルダーと、前記上下の定盤の軸線に平行で前記キャリアホルダーに軸着されるホルダー側の軸、および該ホルダー側の軸に平行であると共に所定の距離をおいて基体に軸着される基体側の軸を備え、前記基体側の軸を中心にホルダー側の軸を旋回させることでキャリアホルダーを基体に対して自転しない円運動をさせる偏心アームと、該偏心アームを基体側の軸を中心に回転させる回転駆動装置とを具備することで、簡単な構成でありながら、キャリアホルダーに保持されたキャリアを好適に自転しない円運動をさせることができる。

【０００８】また、前記偏心アームが複数設けられ、該複数の偏心アームは同期して円運動するよう、前記基体側の軸同士がタイミングチェーン等の同期手段によって連繋されていることで、簡単な構成でキャリアを好適且つ安定的に運動させることができる。

【０００９】

【発明の実施の形態】以下、本発明の好適な実施例を添付図面に基づいて詳細に説明する。図１は本発明にかかる両面研磨装置の一実施例を模式的に示した斜視組み立て図であり、図２は図１の実施例が作動している際の各構成の位置関係を示す側断面図である。本実施例は、板状のワークであるシリコンのウェーハ１０を研磨する両面研磨装置であり、薄平板に透孔１２ａが設けられて成るキャリア１２と、そのキャリア１２の透孔内に配されたウェーハ１０を、上下から挟むと共にウェーハ１０に対して相対的に移動して研磨する上下の定盤１４、１６とを備える。上下の定盤１４、１６のそれぞれの表面には、研磨布１４ａ、１６ａが付けられており、その研磨布１４ａ、１６ａによって研磨面が形成されている。ウェーハ１０は、円形であり円形の透孔１２ａ内に遊嵌されており、透孔１２ａの中ではフリーに自転可能なサイズになっている。

【００１０】２０はキャリア円運動機構であり、キャリア１２'を、キャリア１２の面と平行な面内で自転しない円運動をさせ、透孔１２ａ内で上定盤１４と下定盤１６の間に保持されたウェーハ１０を旋回移動させる。このキャリア円運動機構２０は次の構成を備える。２２はキャリアホルダーであり、リング状に形成されており、リング本体２２ａと押さえリング２２ｂとを備える。このリング本体２２ａと押さえリング２２ｂとによって円形のキャリア１２の外縁が挟まれて、キャリア１２がキャリアホルダー２２に保持される。

【００１１】２４は偏心アームであり、上下の定盤１４、１６の軸線Ｌに平行でキャリアホルダー２２に軸着されるホルダー側の軸２４ａ、およびそのホルダー側の軸２４ａに平行であると共に所定の距離をおいて基体３０（図２参照）に軸着される基体側の軸２４ｂを備える。すなわち、クランク機構のクランクアームと同様な機能を備えるように形成されている。この偏心アーム２４は、本実施例では基体３０とキャリアホルダー２２との間の４ヶ所に配され、キャリアホルダー２２を支持すると共に、基体側の軸２４ｂを中心にホルダー側の軸２４ａを旋回させることで、キャリアホルダー２２を基体３０に対して自転しない円運動をさせる。ホルダー側の軸２４ａは、キャリアホルダー２２の外周面に突起して設けられた軸受け部２２ｃに回転可能に挿入・軸着されている。これにより、キャリア１２は上下の定盤１４、１６の軸線Ｌから偏心Ｍして旋回（自転しない円運動）する。その円運動の半径は、ホルダー側の軸２４ａと基体側の軸２４ｂとの間隔（偏心Ｍの距離）と同じであり、キャリア１２の全ての点が同一の小円の軌跡を描く運動となる。

【００１２】また、２８はタイミングチェーンであり、各偏心アーム２４の基体側の軸２４ｂに同軸に固定されたスプロケット２５（本実施例では４個）に掛け回されている。このタイミングチェーン２８と４個のスプロケット２５は、４個の偏心アーム２４が同期して円運動するよう、４個の基体側の軸２４ｂ同士を連繋して同期させる同期手段を構成している。この同期手段は、簡単な構成であり、キャリア１２を好適且つ安定的に運動させることができる。これによって研磨精度を向上でき、ウェーハの平坦度を向上できる。なお、同期手段としては、本実施例に限られることはなく、タイミングチェーン、またはギア等を用いてもよいのは勿論である。３２はモータ（例えば、ギャードモータ）であり、３４は出力軸に固定された出力ギヤである。出力ギア３４は偏心アーム２４の基体側の軸２４ｂに同軸に固定されたギア

２６に噛合している。これにより、偏心アーム２４を基体側の軸２４ｂを中心に回転させる回転駆動装置が構成されている。

【００１３】なお、回転駆動装置は、各偏心アーム２４にそれぞれ対応して配された複数のモータ（例えば、電動モータ）を利用することもできる。電動モータであれば、電気的に同期を取ることで、複数の偏心アーム２４を同期運動させ、キャリア１２をスムースに運動させることができる。また、本実施例では偏心アーム２４を４個配設した場合について説明したが、本発明はこれに限らず、偏心アーム２４は最低３個あれば、キャリアホルダー２２を好適に支持することができる。さらに、直交する２軸の直線運動の合成によって２次元運動を得ることができるＸＹテーブルの移動体と、前記キャリアホルダー２２とを一体化して運動できるようにすれば、１個の偏心アーム２４の駆動によって、キャリアホルダー２２を自転しない円運動させることができる。すなわち、ＸＹテーブルの直交する２軸に延びるガイドによって案内されることで、前記移動体は自転しない運動をするのであって、この移動体の運動をキャリアホルダー２２の運動（自転しない円運動）に好適に利用できる。また、偏心アーム２４を用いず、ＸＹテーブルの駆動手段、例えばＸ軸およびＹ軸のそれぞれに配されたサーボモータとタイミングチェーンまたはボールネジ等から成る駆動機構を利用（制御）することで、前記移動体と一体化したキャリアホルダー２２を運動（自転しない円運動）させることもできる。この場合は、２個のモータを使用することになるが、モータを制御することで円運動の他にも自転しない種々の２次元運動を得ることができ、その運動をウェーハ１０の研磨に利用できる。

【００１４】３６は下定盤回転用モータであり、下定盤１６を回転させる動力装置である。例えば、本実施例のように、ギャードモータを用いることができ、その出力軸は下定盤１６の回転軸に直結させてもよい。３８は上定盤回転用動力手段であり、上定盤１４を回転させる。下定盤回転用モータ３６および上定盤回転用動力手段３８は、回転方向および回転速度を自由に変更できるものとすれば、種々の研磨仕様に柔軟に対応できる。また、この両面研磨装置では、キャリア１２の透孔１２ａ内に配されたウェーハ１０を、図２に示すように上定盤１４と下定盤１６でサンドイッチにして、そのウェーハの研磨加工がなされる。この際、ウェーハ１０が挟圧される力は、主に上定盤１４側に設けられた加圧手段（図示せず）による。例えば、なお、空気圧を利用し、エアバック方式で上定盤１４をウェーハ１０に押しつけるようにしてもよい。空気圧を制御することで好適かつ容易に加圧力を調整できる。なお、上定盤１４側には加圧手段の他に上定盤１４を昇降動させる昇降装置４０が設けられ、ウェーハ１０の給排のときなどに作動する。

【００１５】次に、本発明の使用方法について説明する。先ず、キャリア１２を運動させないで、上定盤１４と下定盤１６とを回転速度の絶対値は同じであるが反対方向へ回転させた場合を説明する。すなわち、図１に示すように、例えば、上定盤１４は時計回転をさせ、下定盤１６は反時計回転させる。この場合は、全く反対方向に摩擦力が作用するから、その運動力が相互に相殺されて、理論的にはウェーハ１０は止まった状態で両面の研磨がなされる。但し、この場合には、上定盤１４および下定盤１６では、その外周へ向かう程その周速度が大きくなる。従って、ウェーハ１０の上下の定盤１４、１６の軸線Ｌに対応する部分から遠い部分ほど研磨が促進され、ウェーハ１０が均一に研磨されない。

【００１６】次に、キャリア１２を前述した構成からなる運動機構によって、自転しない円運動をさせることによる研磨作用について説明する。上下の定盤１４、１６の回転を考えず、キャリア１２の自転しない円運動のみを考えた場合、その自転しない円運動によれば、運動をする部材（キャリア１２）の全ての点で全く同じ運動がなされることになる。これは、全ての点が同一の運動となる意味で、一種の揺動運動であり、揺動運動の軌跡が円になったと考えればよい。従って、自転しない円運動をするキャリア１２を介し、ウェーハ１０を旋回移動すれば、この運動による作用に限っていえば、ウェーハ１０の両面は均一に研磨される。

【００１７】そして、上定盤１４と下定盤１６の回転運動と、キャリア１２の自転しない円運動とを同時に作動させた場合は、ウェーハ１０が透孔１２ａの中で回転可能に保持されているため、特に上定盤１４と下定盤１６の回転速度の絶対値に差をつけた場合（一方の定盤に対して他方の定盤の回転速度を速くした場合）、ウェーハ１０は、その回転速度の速い側の定盤の回転方向へ、連れ回りする。すなわち、ウェーハ１０は所定の方向へ自転することになる。このようにウェーハ１０が自転することで、上定盤１４および下定盤１６では、その外周へ向かう程その周速度が大きくなっているが、その影響をなくすことができ、ウェーハ１０を均一に研磨できる。なお、ウェーハ１０の両面を均一に研磨するには、上定盤１４と下定盤１６の回転速度を交互に一方が速くなるように制御すればよい。

【００１８】次に、本発明の他の使用方法について説明する。以上の実施例では、複数の透孔１２ａが設けられ、複数のワーク（ウェーハ１０）を同時に研磨する場合について説明したが、本発明ではこれに限らず、例えば、キャリア１２には大型なワークが保持される透孔１２ａを一個のみ設け、その大型ワークの両面を研磨する研磨装置としても利用できる。なお、大型なワークとしては、液晶に用いる矩形状のガラス板、或いは枚葉で加工されるウェーハ（円形）等のワークがある。この場合、大型なワークは、キャリア１２の中心からその周縁近傍付近にわたってほぼ全面的に配されることになる。

このとき、キャリア１２による自転しない円運動を主に利用して研磨し、上定盤１４および下定盤１６の回転速度は、研磨むらが発生しない程度に遅くすれば、ワークの全体面について均一に且つ好適に研磨できる。すなわち、上定盤１４および下定盤１６では、周速度の違いで外周ほど研磨作用が大きくなるが、その回転速度がキャリア１２の自転しない円運動に比べて非常に遅ければ、研磨作用に直接的には殆ど関与させないようにすることができる。そして、上定盤１４および下定盤１６を回転させることは、ワークに接触する定盤面を常に更新させ、液状の研磨剤をワークの全面へ平均的に供給するなど、研磨作用を良好にするため、間接的に好適に寄与できる。

【００１９】以上の実施例ではポリッシング装置について説明したが、本発明はラッピング装置にも好適に適用できるのは勿論である。以上、本発明につき好適な実施例を挙げて種々説明してきたが、本発明はこの実施例に限定されるものではなく、発明の精神を逸脱しない範囲内で多くの改変を施し得るのは勿論のことである。

【００２０】

【発明の効果】本発明の両面研磨装置によれば、キャリア円運動機構によって、キャリアを、そのキャリアの面と平行な面内で自転しない円運動をさせ、キャリアの透孔内で上下の定盤の間に保持されたワークを旋回移動させる。自転しない円運動によれば、キャリアの全ての部分で同一の運動がなされるため、ウェーハを均一に研磨＊できると共に、キャリア全面と上下の定盤の研磨面を効率よく利用できる。このため、ウェーハの研磨むらを防止してウェーハの平坦度を向上できると共に、ワークの大型化に好適に対応して定盤の研磨面を効率良く利用できるという著効を奏する。また、従来の遊星歯車機構を用いた両面研磨装置に比べて、構成が複雑にならず、大型化に好適に対応できる構成であり、製造コストを低減できるという著効を奏する。

【図面の簡単な説明】

【図１】本発明にかかる両面研磨装置の一実施例の斜視組み立て図である。

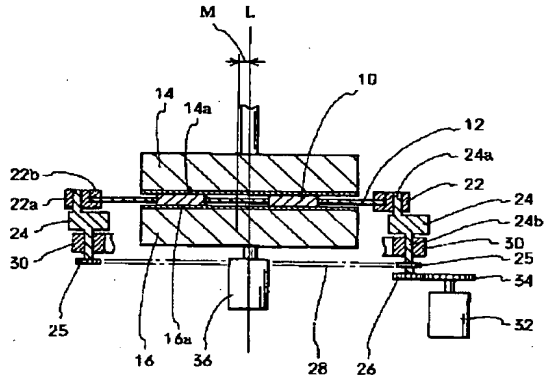
【図２】図１の実施例の側断面図である。

【図３】従来技術を説明する側断面図である。

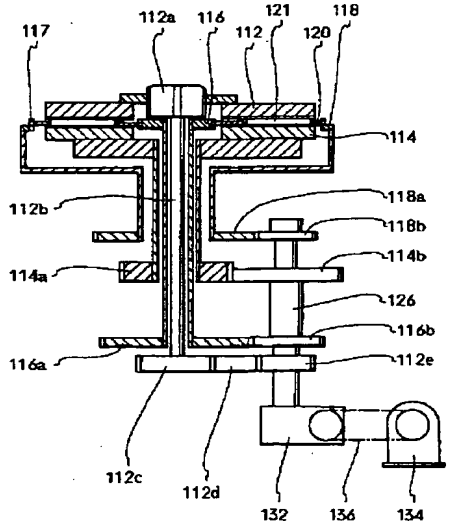
【符号の説明】

１０　ウェーハ
１２　キャリア
１２ａ　透孔
１４　上定盤
１６　下定盤
２０　キャリア円運動機構
２２　キャリアホルダー
２４　偏心アーム
２４ａ　ホルダー側の軸
２４ｂ　基体側の軸
２８　タイミングチェーン
３０　基体

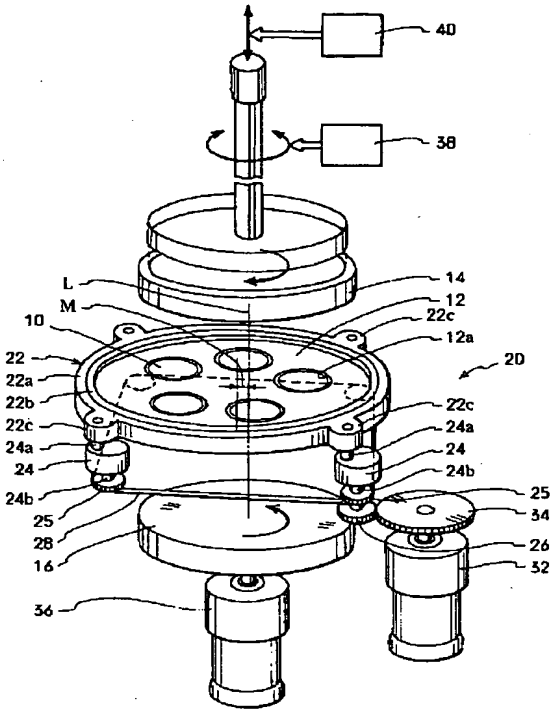
【図２】



【図３】



【図１】



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【手続補正書】
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【手続補正１】
【補正対象書類名】明細書
【補正対象項目名】特許請求の範囲
【補正方法】変更
【補正内容】
【特許請求の範囲】
【請求項１】　平板にワークが入る透孔が設けられて成るキャリアと、
該キャリアの上側に配され、前記キャリアの透孔内に配された前記ワークの上面を研磨する上定盤と、
前記キャリアの下側に配され、前記キャリアの透孔内に配された前記ワークを前記上定盤と挟むと共に、前記ワークの下面を研磨する下定盤と、
リング状に形成され、その内側に前記キャリアを保持するキャリアホルダーと、
該キャリアホルダーを介して前記キャリアを該キャリアの面と平行な面内で自転しない円運動をさせることで、前記透孔内で前記上定盤と前記下定盤との間に保持された前記ワークを前記キャリアに伴わせて運動させ、前記上定盤及び前記下定盤で前記ワークの両面を研磨させるキャリア円運動機構とを具備することを特徴とする両面研磨装置。
【請求項２】　平板にワークが入る透孔が設けられて成るキャリアと、
該キャリアの上側に配され、前記キャリアの透孔内に配された前記ワークの上面を研磨する上定盤と、
前記キャリアの下側に配され、前記キャリアの透孔内に配された前記ワークを前記上定盤と挟むと共に、前記ワークの下面を研磨する下定盤と、
前記キャリアを該キャリアの面と平行な面内で自転しない円運動をさせることで、前記透孔内で前記上定盤と前記下定盤との間に保持された前記ワークを前記キャリアに伴わせて運動させ、前記上定盤及び前記下定盤でワークの両面を研磨させるキャリア円運動機構とを備え、
前記キャリア円運動機構は、
基体と、
前記キャリアを保持するキャリアホルダーと、
前記上定盤及び下定盤の軸線方向に軸心が平行であって前記キャリアホルダーに軸着されるホルダー側の軸、及び該ホルダー側の軸に軸心が平行であると共に所定の距離をおいて基体に軸着される基体側の軸を備え、前記基体側の軸を中心にホルダー側の軸を旋回させることで前記キャリアホルダーを前記基体に対して自転しない円運動をさせるクランクアームと、
該クランクアームを基体側の軸を中心に回転させる回転駆動装置とを具備することを特徴とする両面研磨装置。
【請求項３】　前記クランクアームが複数設けられ、該複数のクランクアームは同期して円運動するよう、前記基体側の軸同士がタイミングチェーン等の同期手段によって連繋されていることを特徴とする請求項２記載の両面研磨装置。
【請求項４】　前記上定盤及び前記下定盤は、自転駆動されることを特徴とする請求項１、２又は３記載の両面研磨装置。
【手続補正２】
【補正対象書類名】明細書
【補正対象項目名】０００６
【補正方法】変更
【補正内容】
【０００６】
【課題を解決するための手段】上記の目的を達成するため、本発明は次の構成を備える。すなわち、本発明は、平板にワークが入る透孔が設けられて成るキャリアと、該キャリアの上側に配され、前記キャリアの透孔内に配された前記ワークの上面を研磨する上定盤と、前記キャリアの下側に配され、前記キャリアの透孔内に配された前記ワークを前記上定盤と挟むと共に、前記ワークの下面を研磨する下定盤と、リング状に形成され、その内側に前記キャリアを保持するキャリアホルダーと、該キャリアホルダーを介して前記キャリアを該キャリアの面と

平行な面内で自転しない円運動をさせることで、前記透孔内で前記上定盤と前記下定盤との間に保持された前記ワークを前記キャリアに伴わせて運動させ、前記上定盤及び前記下定盤で前記ワークの両面を研磨させるキャリア円運動機構とを具備する。

【手続補正３】
【補正対象書類名】明細書
【補正対象項目名】０００７
【補正方法】変更
【補正内容】
【０００７】また、本発明は、平板にワークが入る透孔が設けられて成るキャリアと、該キャリアの上側に配され、前記キャリアの透孔内に配された前記ワークの上面を研磨する上定盤と、前記キャリアの下側に配され、前記キャリアの透孔内に配された前記ワークを前記上定盤と挟むと共に、前記ワークの下面を研磨する下定盤と、前記キャリアを該キャリアの面と平行な面内で自転しない円運動をさせることで、前記透孔内で前記上定盤と前記下定盤との間に保持された前記ワークを前記キャリアに伴わせて運動させ、前記上定盤及び前記下定盤でワークの両面を研磨させるキャリア円運動機構とを備え、前記キャリア円運動機構は、基体と、前記キャリアを保持するキャリアホルダーと、前記上定盤及び下定盤の軸線方向に軸心が平行であって前記キャリアホルダーに軸着されるホルダー側の軸、及び該ホルダー側の軸に軸心が平行であると共に所定の距離をおいて基体に軸着される基体側の軸を備え、前記基体側の軸を中心にホルダー側の軸を旋回させることで前記キャリアホルダーを前記基体に対して自転しない円運動をさせるクランクアームと、該クランクアームを基体側の軸を中心に回転させる回転駆動装置とを具備することを特徴とする両面研磨装置にもある。これによれば、簡単な構成でありながら、キャリアホルダーに保持されたキャリアを好適に自転しない円運動させることができる。

【手続補正４】
【補正対象書類名】明細書
【補正対象項目名】０００８
【補正方法】変更
【補正内容】
【０００８】また、前記クランクアームが複数設けられ、該複数のクランクアームは同期して円運動するよう、前記基体側の軸同士がタイミングチェーン等の同期手段によって連繋されていること、簡単な構成でキャリアを好適且つ安定的に運動させることができる。また、前記上定盤及び前記下定盤が、自転駆動されることで、ワークを好適に研磨することができる。